U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

AFGHAN GEOLOGICAL SURVEY
Prepared in cooperation with the U.S. Geological Survey and the Afghanistan Geodesy and Cartography Head Office
Under the auspices of the U.S. Agency for International Development and the U.S. Trade and Development Agency

USGS OPEN-FILE REPORT 2005-1110-A
AGS OPEN-FILE REPORT (417/418) 2005-1110-A
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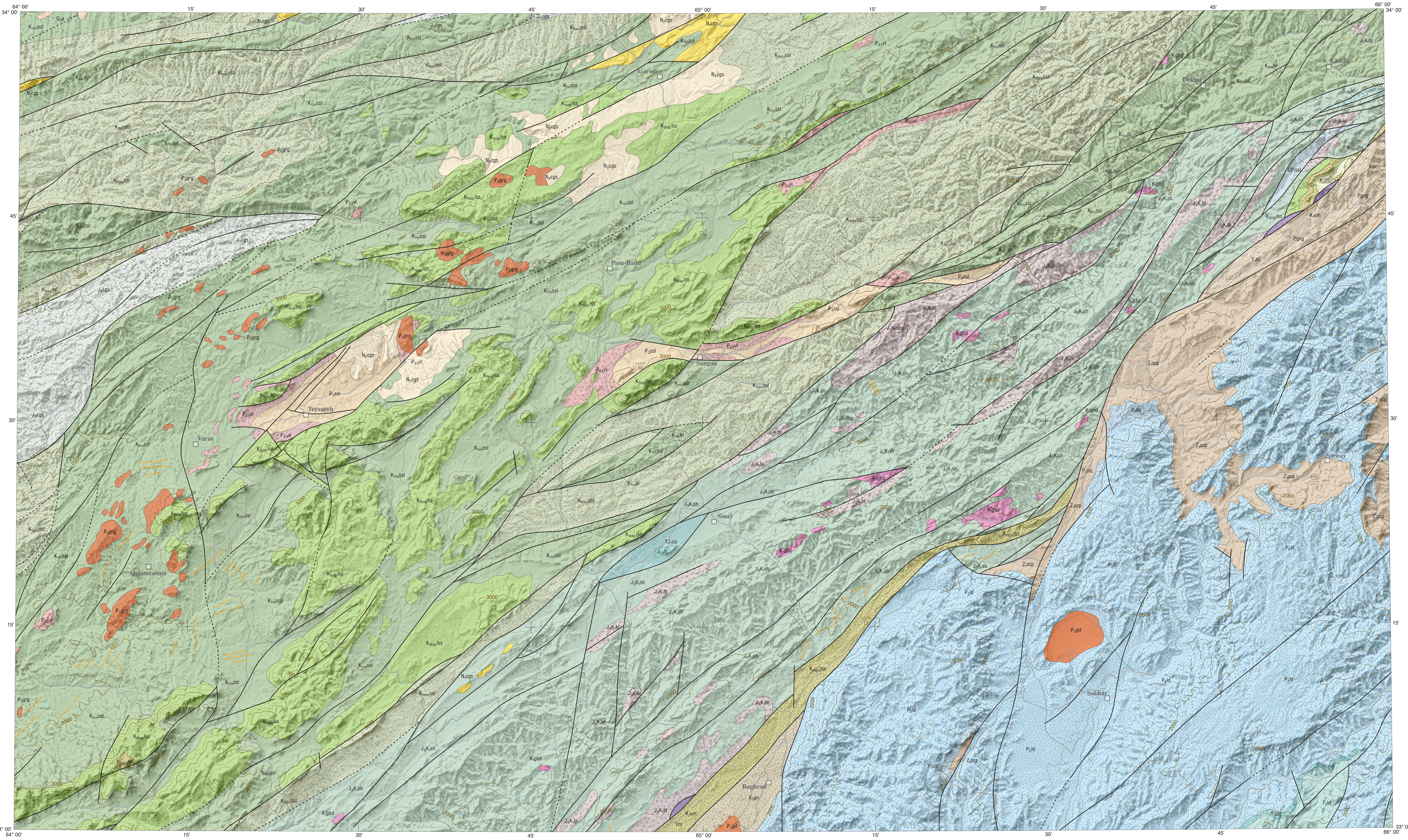
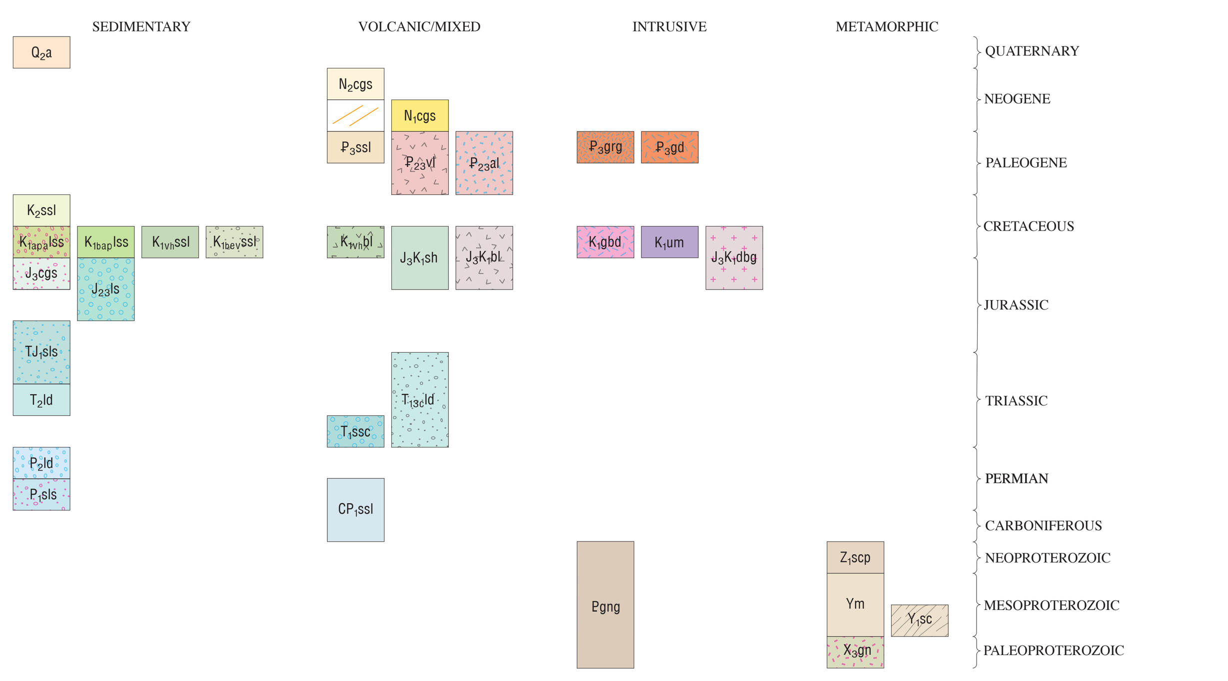


Base from Shuttle Radar Topography Mission (SRTM) 85-meter digital data
Cultural data from digital files from AIMS Web site (http://www.aims.org.af)
Projection: Universal Transverse Mercator, zone 41, WGS 84 Datum

SCALE 1:250 000
5 0 5 10 15 20 25 30 35 40 KILOMETERS
5 0 5 10 15 20 MILES
CONTOUR INTERVAL 250 METERS

Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Q_2a **Conglomerate and sandstone (middle Pleistocene)**—Alluvium: shingly and detrital sediments, gravel, sand more abundant than silt and clay

N_2cgs **Conglomerate and sandstone (Pliocene)**—Gray conglomerate, grit, sandstone more abundant than siltstone, clay, limestone, marl; gypsum, salt; felsic to mafic volcanic rocks

Andesite and diorite (Miocene)—Andesite, diorite more abundant than diabase porphyry dikes (and veins)

N_1cgs **Conglomerate and sandstone (Miocene)**—Red conglomerate, sandstone more abundant than siltstone, clay; felsic and mafic volcanic rocks; limestone, marl; olivine basalt, trachybasalt, andesitic basalt (Taywara Series)

P_3grg **Granite and granodiorite (Oligocene)**—Granite, granite porphyry, and granodiorite more abundant than quartz syenite and granosyenite

P_3gd **Granodiorite (Oligocene)**—Granodiorite (Phase I)

P_3ssl **Sandstone and siltstone (Oligocene)**—Sandstone, siltstone more abundant than clay, conglomerate, limestone, marl; rhyolitic and mafic volcanics

$P_{23}vl$ **Lava (Oligocene and Eocene)**—Basaltic andesite, basalt, trachyte, dacite, rhyolite, ignimbrite, tuff; conglomerate, sandstone, siltstone, limestone

$P_{23}al$ **Andesite lava (Oligocene and Eocene)**—Andesite lava more abundant than basaltic andesite, basalt, trachyte, dacite, rhyolite, ignimbrite, tuff; conglomerate, sandstone, siltstone, limestone

K_2ssl **Sandstone and siltstone (Late Cretaceous)**—Red sandstone, siltstone, conglomerate (Khashrud tectonic zone)

$K_{1apa}lss$ **Limestone and sandstone (Early Cretaceous (Albian and Aptian))**—Limestone, marl, sandstone more abundant than conglomerate

$K_{1bap}lss$ **Limestone and sandstone (Early Cretaceous (Aptian and Barremian))**—Limestone, marl, sandstone more abundant than conglomerate

$K_{1vh}ssl$ **Sandstone and siltstone (Early Cretaceous (Hauterivian and Valanginian))**—Sandstone, siltstone more abundant than limestone, marl

$K_{1vh}bl$ **Basalt lava (Early Cretaceous (Hauterivian and Valanginian))**—Basalt lava

$K_{1bev}ssl$ **Sandstone and siltstone (Early Cretaceous (Valanginian and Berriasian))**—Sandstone, siltstone more abundant than limestone, marl

K_1gbd **Gabbro and diorite (Early Cretaceous)**—Gabbro, diorite more abundant than plagiogranite

K_1um **Ultramafic intrusions (Early Cretaceous)**—Dunite, peridotite, serpentinite

J_3K_1sh **Shale and siltstone (Early Cretaceous (Hauterivian) and Late Jurassic (Tithonian))**—Shale more abundant than siltstone, sandstone, conglomerate, chert, limestone, greenstone, felsic and mafic volcanic rocks

J_3K_1bl **Basalt lava (Early Cretaceous (Hauterivian) and Late Jurassic (Tithonian))**—Basalt lava more abundant than shale, siltstone, sandstone, conglomerate, chert, limestone, greenstone, felsic volcanic rocks

J_3K_1dbg **Diabase and gabbrodiabase (Early Cretaceous and Late Jurassic)**—Diabase and gabbrodiabase

J_3cgs **Conglomerate and sandstone (Late Jurassic)**—Conglomerate, sandstone more abundant than siltstone, clay, limestone, gypsum; limestone, marl

$J_{23}ls$ **Limestone (Late and Middle Jurassic)**—Limestone and marl

TJ_1sls **Siltstone and sandstone (Early Jurassic and Late Triassic (Rhaetian))**—Siltstone, sandstone more abundant than shale, marl, limestone

$T_{13c}ld$ **Limestone and dolomite (Late Triassic (Carnian) and Early Triassic)**—Limestone, sandstone, shale, conglomerate, chert, mafic volcanic rocks

T_2ld **Limestone and dolomite (Middle Triassic)**—Limestone, dolomite

T_1ssc **Sandstone and conglomerate (Early Triassic)**—Variegated sandstone, gravelstone, conglomerate, chert, rhyolite and basalt volcanic rocks

P_2ld **Limestone and dolomite (Late Permian)**—Limestone, dolomite more abundant than marl, conglomerate, sandstone, siltstone, shale, bauxite and bauxite-bearing rocks

P_1sls **Siltstone and sandstone (Early Permian)**—Siltstone and sandstone more abundant than slate, limestone, conglomerate (Helmand zone)

CP_1ssl **Sandstone and siltstone (Early Permian and Carboniferous)**—Sandstone and siltstone more abundant than slate, andesite to basalt volcanic rocks

Z_1scp **Schist and phyllite (early Neoproterozoic)**—Greenschist and phyllite derived from slate, schist, sandstone more abundant than metacarbonates (marble, dolomite, chert) and metavolcanic rocks

Ym **Metamorphic rocks, undivided (Mesoproterozoic)**—Greenschist, gneiss, quartzite, marble, amphibolite (metavolcanic lava and sedimentary rocks)

Y_1sc **Schist (early Mesoproterozoic)**—Quartz-sericite-carbonate schist and chlorite-sericite-quartz schist; marble, quartzite, amphibolite

Pgng **Gneiss and granite (Proterozoic)**—Gneiss-granite, granite, plagiogranite

X_3gn **Gneiss (late Paleoproterozoic)**—Biotite gneiss and garnet-biotite gneiss; schist, quartzite, marble, amphibolite

EXPLANATION OF MAP SYMBOLS

Contact

Fault—Dashed where approximately located; dotted where concealed

DATA SUMMARY

This map was produced from several larger digital datasets. Topography was derived from Shuttle Radar Topography Mission (SRTM) 85-meter digital data. Gaps in the original dataset were filled with data digitized from contours on 1:200,000-scale Soviet General Staff Sheets (1978–1997). Contours were generated by cubic convolution averaged over four pixels using TNTmips[1] surface-modeling capabilities. Cultural data were extracted from files downloaded from the Afghanistan Information Management Service (AIMS) Web site (http://www.aims.org.af). The AIMS files were originally derived from maps produced by the Afghanistan Geodesy and Cartography Head Office (AGCHO). Geologic data and the international boundary of Afghanistan were taken directly from Abdullah and Chmyriov (1977).

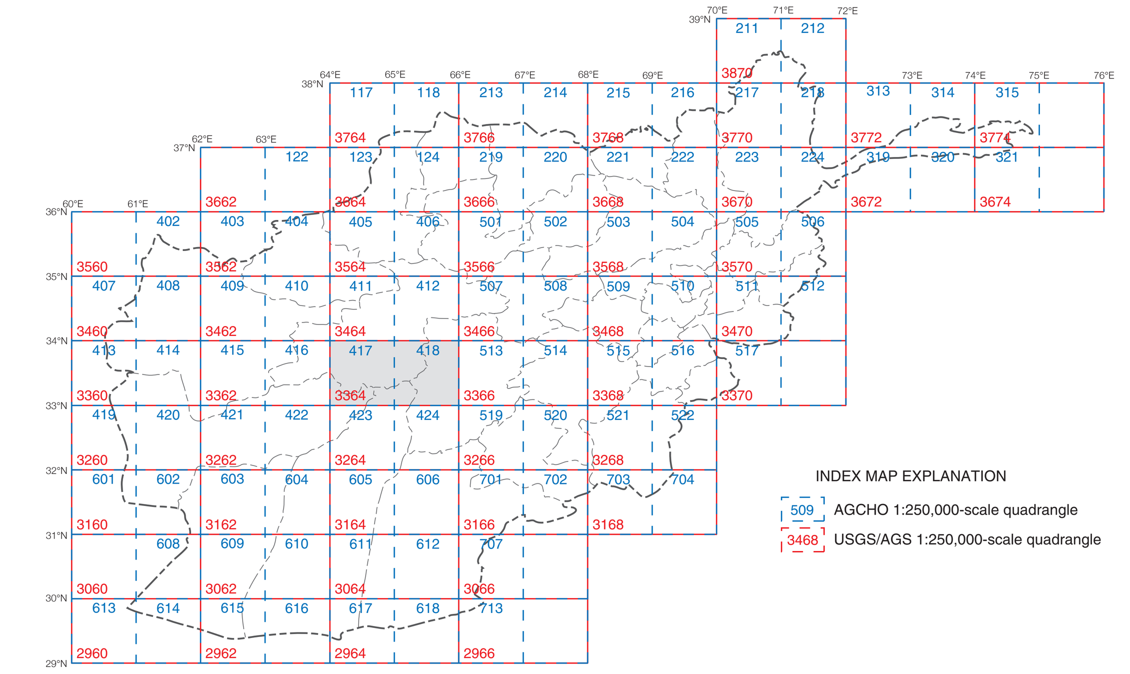
It is the primary intent of the U.S. Geological Survey (USGS) to present the geologic data in a useful format while making them publicly available. These data represent the state of geologic mapping in Afghanistan as of 2005, although the original map was released in the late 1970s (Abdullah and Chmyriov, 1977). The USGS has made no attempt to modify original geologic map-unit boundaries and faults; however, modifications to map-unit symbology, and minor modifications to map-unit descriptions, have been made to clarify lithostratigraphy and to modernize terminology. The generation of a Correlation of Map Units (CMU) diagram required interpretation of the original data, because no CMU diagram was presented by Abdullah and Chmyriov (1977).

This map is part of a series that includes a geologic map, a topographic map, a Landsat natural-color-image map, and a Landsat false-color-image map for the USGS/AGS (Afghan Geological Survey) quadrangles shown on the index map. The maps for any given quadrangle have the same open-file number but a different letter suffix, namely, -A, -B, -C, and -D for the geologic, topographic, Landsat natural-color, and Landsat false-color maps, respectively. The present map series is to be followed by a second series, in which the geology is reinterpreted on the basis of analysis of remote-sensing data, limited fieldwork, and library research. The second series is to be produced by the USGS in cooperation with the AGS and AGCHO.

REFERENCE CITED

Abdullah, Sh., and Chmyriov, V.M., eds., 1977, Map of mineral resources of Afghanistan: Kabul, Ministry of Mines and Industries of the Democratic Republic of Afghanistan, Department of Geological and Mineral Survey, V/O “Technoexport” USSR, scale 1:500,000.

[1]Geospatial analysis software developed by MicroImages, Inc., Lincoln, NE 68508-2010.



GEOLOGIC MAP OF QUADRANGLE 3364, PASA-BAND (417) AND KEJRAN (418) QUADRANGLES, AFGHANISTAN

Compiled by
Kevin C. McKinney, David A. Sawyer, and Kenzie J. Turner

2005